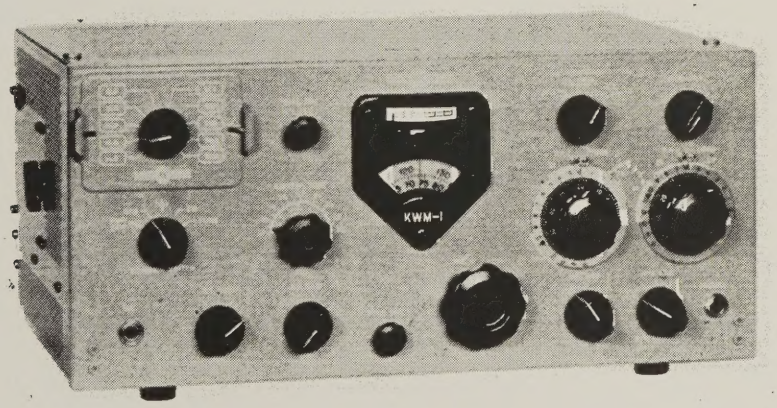
INSTRUCTIONS FOR

520 5884 00
2nd EDITION, 15 AUGUST 1959

TRANSCEIVER

KWM-1

136B-1 NOISE BLANKER



COLLINS RADIO COMPANY

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520 5884 00
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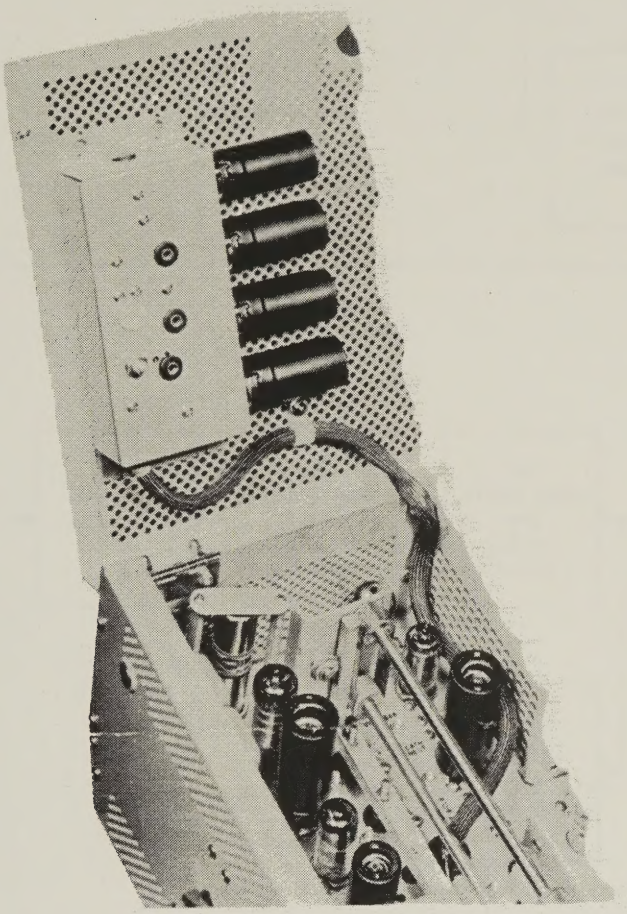
136B-1 NOISE BLANKER



C359-03-P

Figure 1. 136B-1 Noise Blanker Installed in KWM-1 Transceiver

1.1 DESCRIPTION.

The 136B-1 Noise Blanker converts noise to bias pulses for gating the receive circuits of the KWM-1 Transceiver. This minimizes receiver output noise when it is a result of radiated noise present on the antenna. Figure 1 shows the 136B-1 installed in the KWM-1.

Noise present in the 40.0-mc portion of the spectrum occurs simultaneously with that in the high-frequency (3-30 mc) portion. The 136B-1 should be provided with its own, separately tuned 40.0-mc antenna. A simple, six-foot, quarter-wave, coax-fed whip is best. The center pin for the coaxial connector of the mobile mount is included. Although a separate antenna is best for operation of the blanker, the car broadcast whip may be used without disabling the broadcast receiver if adequate isolation is provided. See figure 2.

2.1 INSTALLATION.

a. Remove the bottom cover of the KWM-1.

b. Remove the cover plate near V3 and V4, and install the grommet as shown in the bottom view, figure 6, installation drawing.

c. Mount the 136B-1 Noise Blanker inside the top cover, as shown in figure 1, using existing holes in the perforated pattern as mounting. After the blanker is mounted, check clearances by closing cover and observing if any part of the blanker rubs on the rear slug rack bracket, rear pulley of the slug rack, vfo tube, or thumb nut on the rear of the 13C-1 Crystal Box. If any interference is found, the location of the blanker can be adjusted by loosening the mounting screws and repositioning.

d. Anchor the noise blanker cable to the cover of the KWM-1 as shown. Dress the cable alongside the power amplifier cage and down on the chassis. Cover must be fully opened so the weight of the cover and blanker does not pull the cable. Feed the cable through the grommet in the center area of the slug rack as shown in the bottom view, detail B, figure 6. Pull the cable slowly through the grommet so the grommet will not pull out of the chassis hole. Feed the white, brown, and green wire back through the grommet to the top side of the KWM-1 chassis as shown in detail B.

e. Install the terminal strip beside the mechanical filter using the screw and lock washer indicated.

f. Remove the 0.001-uf capacitor, C48, from pin 7 of V8 and pin 3 of T1. Solder a 100-uuf capacitor (part number 912 0495 00) between pin 3 of T1 and the insulated tie point of the terminal strip.

g. Disconnect the large coaxial lead from the bus jumper on K1 as shown in figure 6, section A-A.

h. Install the insulated terminal and ground lug on side of case in any of the holes in the perforated pattern. Locate the terminal so the disconnected coaxial lead will reach it. Use the short screw supplied

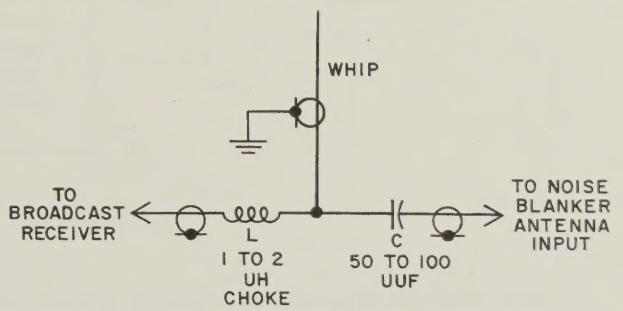


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Figure 2. Suggested Connections for Using the Broadcast Whip for Both Broadcast Receiver and 136B-1 Noise Blanker

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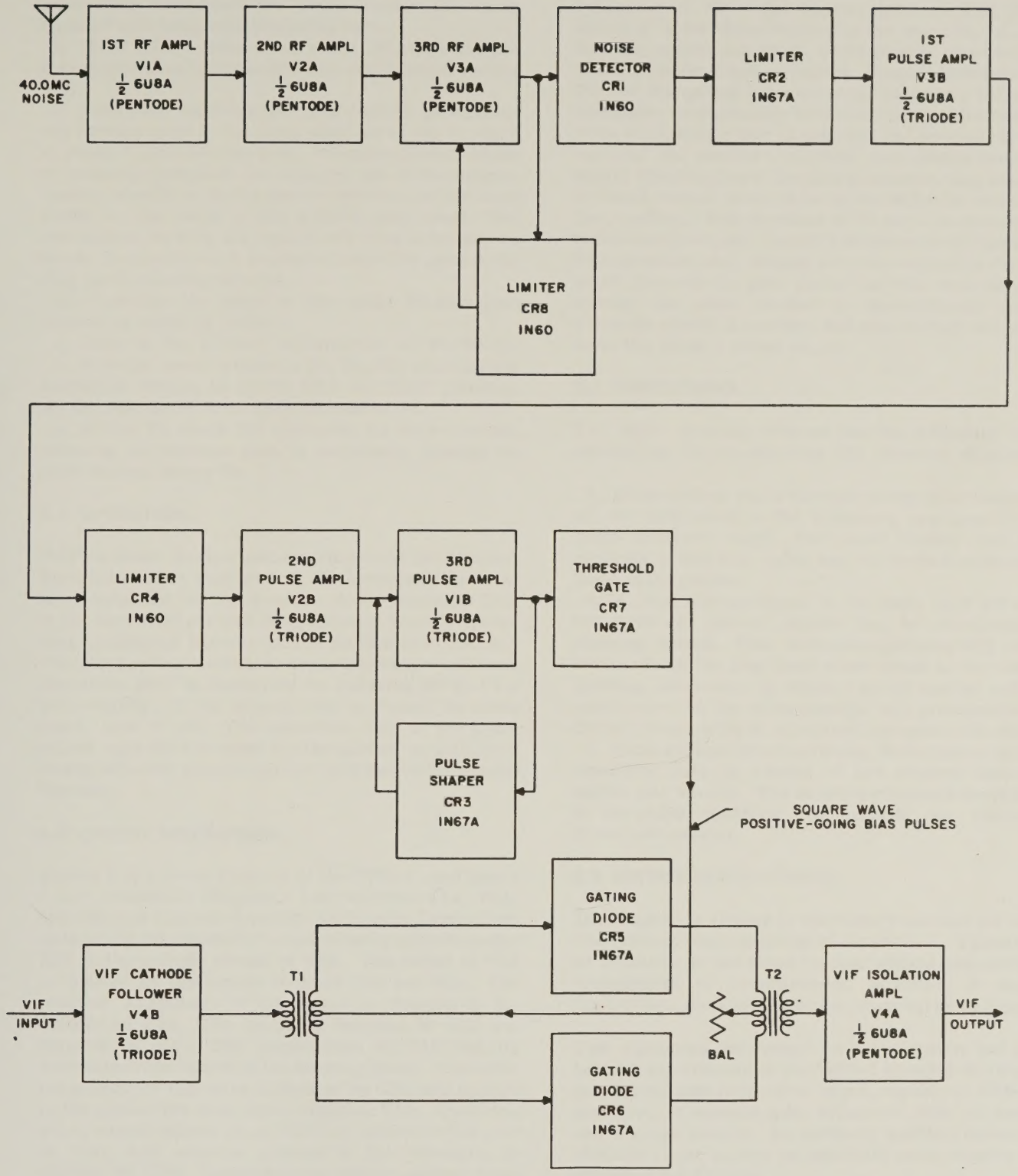


Figure 3. 136B-1 Noise Blanker, Block Diagram

for this mounting. Connect the shield of the noise blanker coaxial lead marked ANT. to the ground lug under the insulated terminal. Solder the sleeved bus from the ground lug under the terminal to the ground lug on the filter box.

i. Make solder connections as shown in the bottom view, figure 6.

j. Remove the crystal box. Remove the knob from the dial dim control and the knob from the EMISSION switch using the Bristo wrench supplied. Cut off the dial dim control shaft as close to the bushing as possible. This is done so the control may be removed without disturbing the slug rack mounting plate. Remove the dial dim potentiometer from the front

panel and disconnect the leads. Solder the leads together and wrap with insulating tape.

k. Make solder connections to the 10K noise blanker gain control and switch as shown in detail B and section B-B.

l. Install the noise blanker gain control, ground lug, and overlay plate to the front panel as shown in detail A, detail B, and section B-B. When the potentiometer is properly installed, the nonturn tab of the potentiometer should be in the groove between the two back plates on the inside of the KWM-1 front panel. The two solder lugs on the switch will have to be bent as shown in section B-B to prevent shorting against the slug rack mounting bracket.

m. Assemble the knob to the noise blanker gain control as shown in detail A.

n. Tune up the KWM-1 Transmitter on 14,250 kc.

o. With the meter switch in PA PLATE position, the EMISSION switch in LOCK KEY or TUNE position, set the MIC GAIN for a plate current of S4.

p. Adjust T1 slugs for maximum PA plate current, reducing microphone gain, if necessary, to keep the plate current below S4.

3.1 OPERATION.

Pull the noise blanker gain knob to turn on the blanker. Turn the blanker gain control clockwise until the noise level indicated on the S-meter drops sharply. This is the threshold point of most efficient blanker operation. Additional blanker gain is not desirable and may degrade performance under some operating conditions. Operation may be improved by reducing KWM-1 r-f gain slightly. If the blanker fails to reduce the noise level, turn it off. The repetition rate of the noise pulses may be too rapid for the blanker to gate, or a strong adjacent channel carrier may be causing erratic blanking.

4.1 CIRCUIT DESCRIPTION.

Figure 3 is a block diagram of the 136B-1, and figure 7 is a schematic diagram. Tube sections V1A, V2A, and V3A are connected as a 40-mc tuned r-f amplifier. Gain of the trf amplifier is controlled by potentiometer R25 in the cathode circuit of V2A. The output of V3A is limited by the action of diode CR8 and V3A. The positive component of the signal is clamped to the cathode of V3A. The signal is detected by CR1 and filtered by C15. The combination of C15 and R5 determines the length of the blanking pulse. The audio component of the noise is limited by CR2 and applied to the grid of the first pulse amplifier V3B. Positive-going output pulses from V3B are applied to the grid of V2B. Any negative portion of the waveform is clipped by CR4. Positive-going square pulses from V1B plate are applied through CR7 to the center tap of T1. The bias of CR7 keeps it cut off and at a high impedance to the low-level pulses, but high-level pulses overcome the bias and pass into the gate circuit. Gating diodes CR5 and CR6 are biased to conduction for normal, noise-free operation. However, when a high-amplitude noise burst occurs, the positive-going pulse passes through CR7 and cuts off both CR5 and CR6. This effectively disconnects the variable i-f signal for the period of the blanking pulse. The length of the blanking pulse varies from a few microseconds to a maximum of 30 microseconds. Blanking pulse length is governed by the magnitude of the noise pulse appearing at the noise blanker antenna. For short duration noise disturbances in the variable i-f, the blanking pulses are short, while greater noise bursts develop longer blanking pulses. Transformers T1 and T2 and the gating diodes are arranged in a balanced modulator configuration so that any noise which results from the gating action is canceled and prevented from entering the receiver circuits. Any discontinuity of signal resulting from the gating action is compensated by tuned-circuit restoration in the following stages of the receiver. Both sections of V4 serve to isolate the noise-operated gate circuit from the receiver circuits. V4A provides only enough gain to compensate for the small loss in the gate circuit so that over-all gain through the noise blanker is approximately unity. Filament power, B+ power, and bias voltage are taken from the KWM-1 power supply.

5.1 LIMITATIONS.

The noise blanking scheme has the following three limitations which decrease the blanking efficiency:

a. Noise pulses which have no energy distribution at 40 mc will occur in the frequency spectrum of the radio receiver range. The noise blanker will not generate a blanking pulse and will permit passage of these noise pulses.

b. A very strong signal in the pass band between the first and second mixers can be modulated by blanking pulses. This modulation process will cause sidebands in the pass band which result in decreased blanking efficiency. A blanker on-off control and r-f gain control on the noise receiver are provided on the KWM-1 front panel to minimize this modulation effect.

c. Some corona noise and static disturbances have a repetition rate in excess of one hundred thousand pulses per second. The blanking efficiency decreases as the pulse repetition rate exceeds five thousand pulses per second.

6.1 SERVICE INSTRUCTIONS.

The blanker is aligned at the factory and will not need realignment when installed in the KWM-1. Tubes may be replaced in the noise blanker without necessity of realignment or readjustment. However, if major repairs are made to the blanker, it should be realigned.

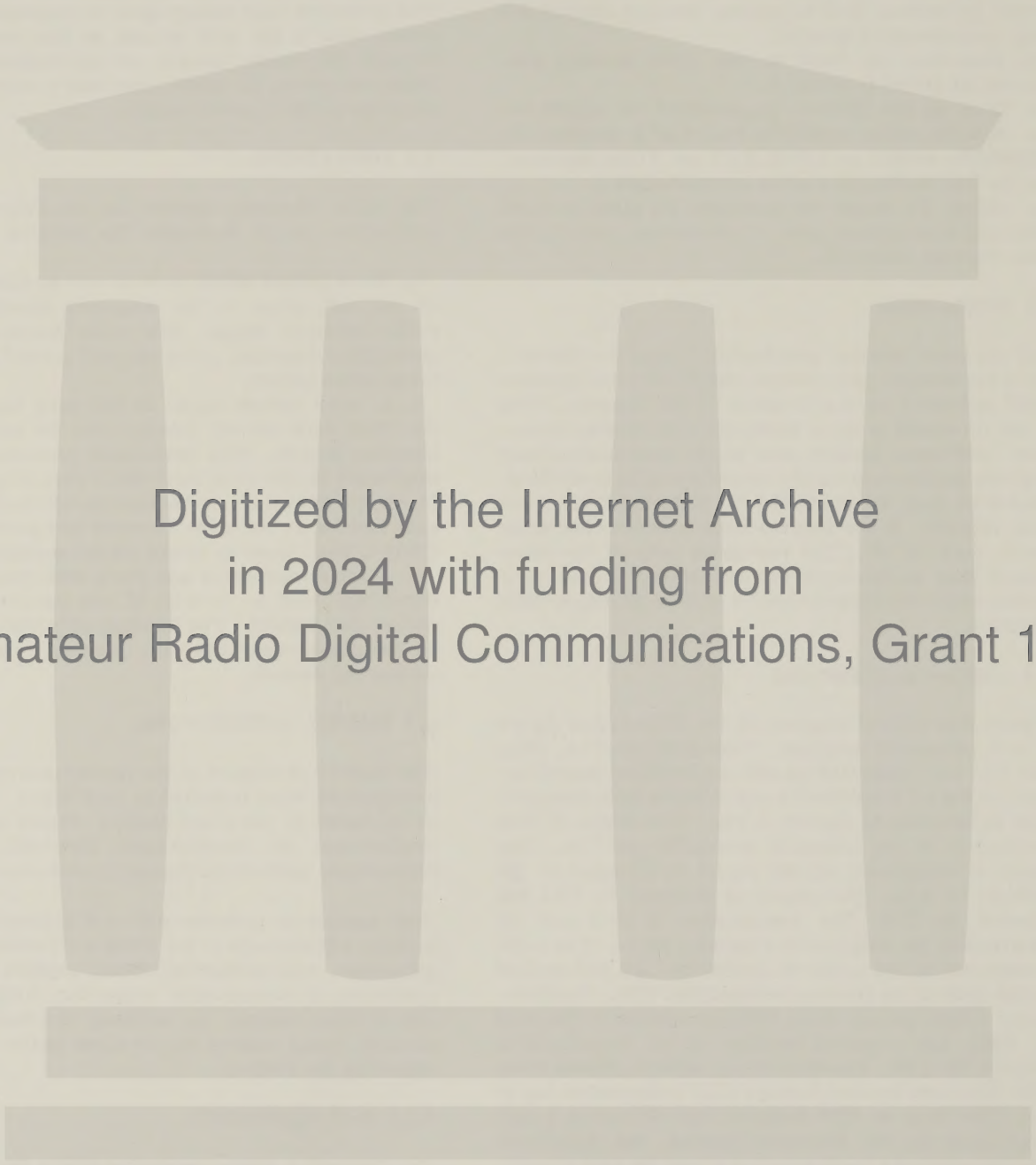
Test equipment necessary for r-f alignment and gate balance adjustments of the 136B-1 consists of a signal generator, with calibrated output, capable of 40.0-mc operation; a vacuum-tube voltmeter, with r-f probe; and a noise source. An ordinary doorbell buzzer or electric razor makes an excellent noise source for adjusting the 136B-1.

6.1.1 R-F ALIGNMENT.

a. Connect a signal generator with a 50-ohm output impedance (such as a Measurements Corporation Model 80) to the coax marked ANT. (blanker r-f input). Set the generator output to 200 microvolts.

b. Set the vtvm to a low scale and zero meter. Connect it between detector test point and ground.

c. Set the signal generator output to 40.0 mc (unmodulated), and increase the generator output until a reading is obtained on the voltmeter. If a full-scale deflection results with less than 200 microvolts input



signal on a 0 to -1 volt scale, the blanker r-f amplifier may be oscillating. The blanker receiver is designed for broadband operation--if the coils are sharply peaked, oscillation can result. If this happens, detune L3 or L4 until oscillation ceases.

d. Adjust L1 and L4 for maximum reading on the vtvm. Reduce generator output as necessary to keep the voltmeter reading between 0 and -1 volt d-c.

e. Set the signal generator to 40.3 mc and peak L3.

f. Set the signal generator to 39.7 mc and peak L2.

g. Repeat the alignment of L1, L2, L3, and L4 to assure optimum band pass. When the generator frequency is moved from 41 mc to 39 mc, the detector output voltage read on the voltmeter should vary smoothly from a maximum at 40 mc to a smaller value on either side. Any peaks between 40 and 39 or 41 mc indicate oscillation. If this occurs, repeak L2 at 39.5 mc and L3 at 40.5 mc.

6.1.2 GATE BALANCE.

a. Disconnect the KWM-1 antenna.

b. Leave the noise blanker antenna connected and the KWM-1 on. Turn the noise source on and couple loosely to the noise antenna.

c. Adjust gate balance potentiometer R32 and variable capacitor C28 for minimum noise output from the KWM-1 speaker. These two adjustments are interactive. First adjust one, then the other until neither produces any appreciable reduction in output noise.

6.1.3 VOLTAGE AND RESISTANCE MEASUREMENTS.

a. Table 1 lists the d-c voltage and resistance measurements on all tube sockets of the 136B-1. Values are nominal.

b. All measurements are made with a vtvm with all tubes in sockets.

c. Resistances of less than one ohm listed as zero.

d. All measurements made from socket pin to ground.

e. Double values of resistance on pins 1 and 9 of V2 and pins 7 and 9 of V3 are caused by diodes in the circuit and the polarity of the ohmmeter used.

TABLE 1. D-C VOLTAGE AND RESISTANCE MEASUREMENTS - 136B-1

TUBE		PIN NUMBER								
		1	2	3	4	5	6	7	8	9
V1	D-C V	100	0	110	0	0	195	2.2	2.6	0
	OHMS	50K	0	110K	0	0	30K	500	500	1.0 meg
V2	D-C V	135	0	*110 **210	0	0	205	*2.2 **15.	4.5	0
	OHMS	45K/70K	4.7K	105K	0	0	25K	*500 **35K	3.0K	500/200K
V3	D-C V	40	0	115	0	0	220	2.6	0	-.5
	OHMS	60K	10K	100K	0	0	25K	100/500	0	10K/16K
V4	D-C V	135	0	130	0	0	225	3.0	14	11
	OHMS	45K	0	90K	0	0	25K	500	3.0K	100K

* Maximum r-f gain
** Minimum r-f gain

7.1 SPECIFICATIONS.

Power source . . . . . .Companion transceiver power supply.

Frequency range . . . . . .The blanking gate of the noise blanker passes i-f signals in the range of 1.5-4.0 mc in the companion transceiver. The input frequency of the noise blanker is 40.0 mc with a minimum bandwidth of 1 mc and a maximum bandwidth of 2 mc.

Cross modulation . . . . . .The noise blanker causes no more than 6 db deterioration in cross modulation and/or blocking characteristics of the companion transceiver.

Sensitivity	A pulse signal input to the noise blanker input of 100 microvolts peak will cause a minimum of 35 db reduction of gain in the receiver signal path.
Spurious response	Internal noise and signals introduced by the noise blanker are less than 1.0 microvolt equivalent signal.
Input impedance	Noise blanker amplifier; 50-ohm nominal ±50% unbalanced.
Output impedance	Signal blanking circuit; high impedance.
Controls	Installation of the noise blanker requires the addition of a blanker r-f gain control with a push-pull on-off switch (furnished with kit).
Tube complement functions	Three r-f noise and pulse amplifiers, one i-f input and output amplifier.
Size	4-11/16 in. x 6-3/8 in. x 1-7/8 in.
Mounting centers	1-1/2 in. x 5-3/4 in.
Weight	1-1/4 lb.

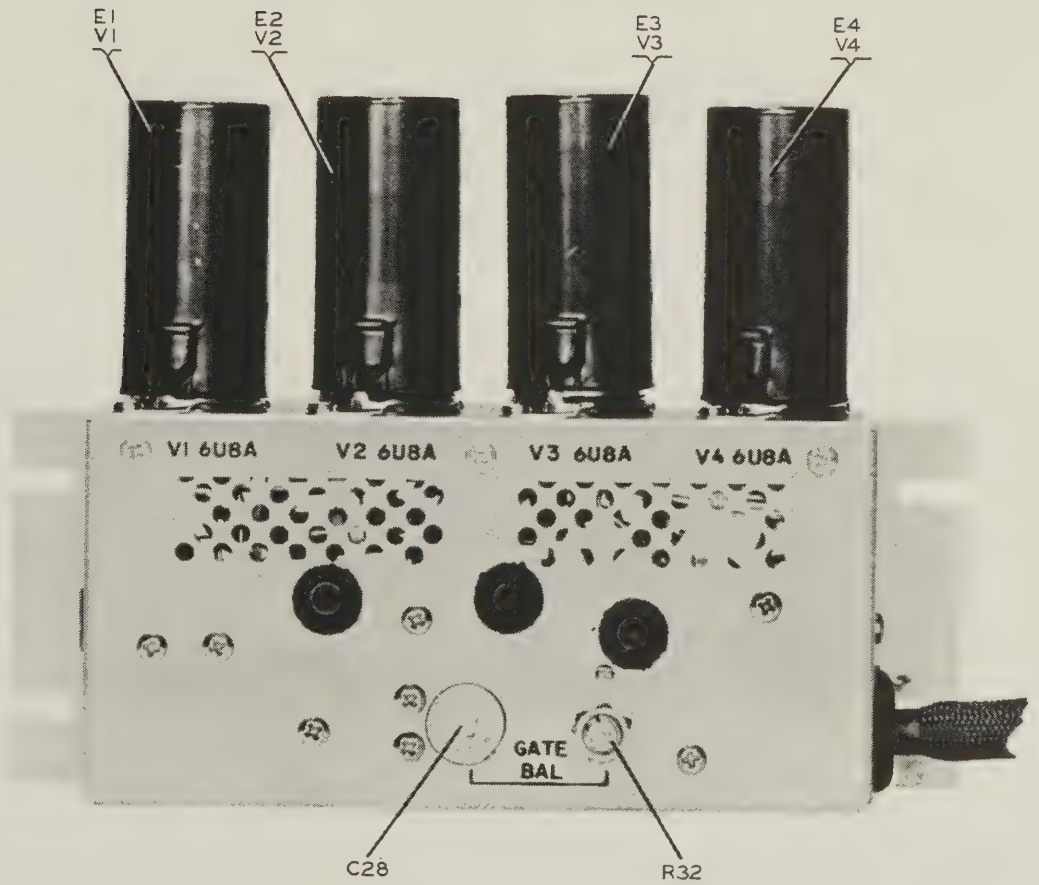


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Figure 4. 136B-1 Noise Blanker, Top View

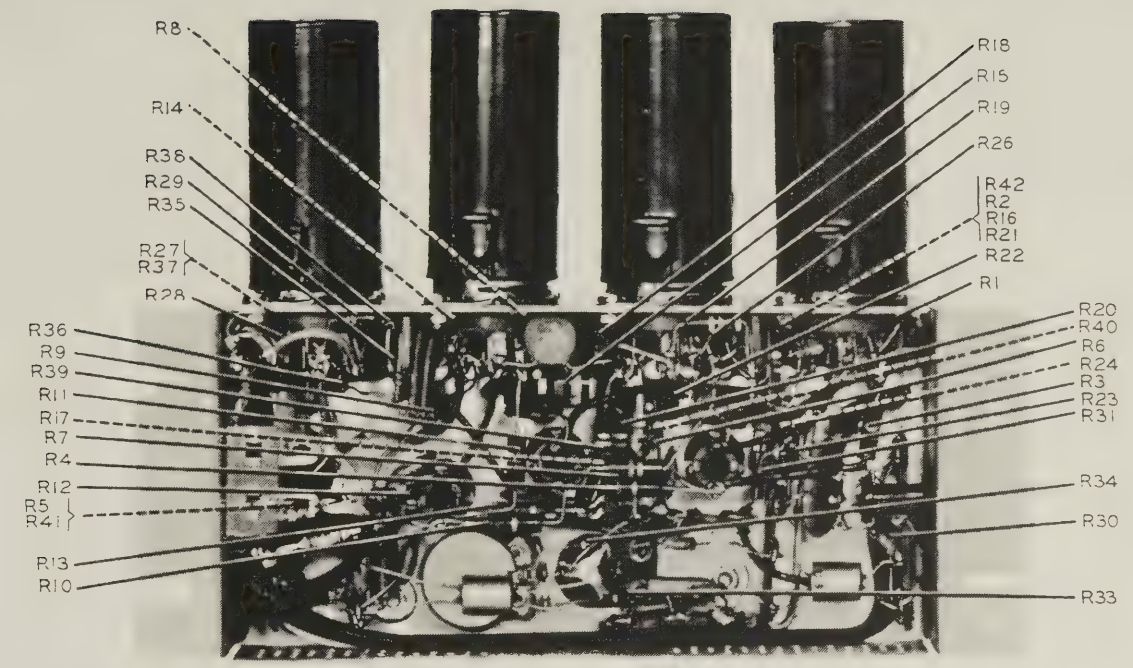

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Figure 5A. 136B-1 Noise Blanker, Bottom View Showing Location of Resistors

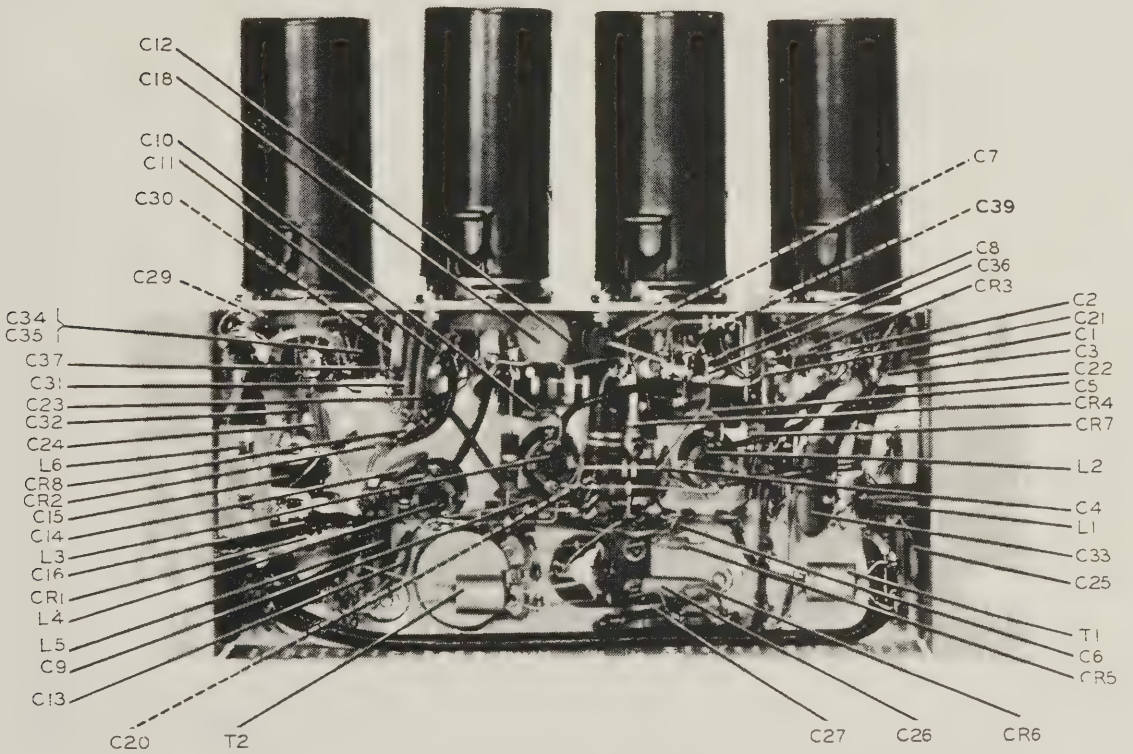

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Figure 5B. 136B-1 Noise Blanker, Bottom View Showing Location of Capacitors, Coils, Transformers, and Diodes

PARTS LIST

Following is the parts list for the 136B-1. Figure 4 is the 136B-1 top view. Figure 5A is the bottom view showing locating of resistors. Figure 5B locates the remaining parts.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	136B-1 NOISE BLANKER	522 1583 00
C1	CAPACITOR, FIXED, MICA: 10 uuf, ±10%, 500 v dc	912 0432 00
C2	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +100%, -20%, 500 v dc	913 3009 00
C3 thru C14	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C15	CAPACITOR, FIXED, MICA: 510 uuf, ±10%, 300 v dc	912 0546 00
C16	CAPACITOR, FIXED, CERAMIC: 22,000 uuf, +100%, -20%, 500 v dc	913 3014 00
C17	NOT USED	
C18	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C19	NOT USED	
C20	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf, -10%, +100%; 25 v dc	183 1163 00
C21	CAPACITOR, FIXED, CERAMIC: 10,000 uuf, +100%, -20%, 500 v dc	913 3013 00
C22	CAPACITOR, FIXED, CERAMIC: same as C16	913 3014 00
C23	CAPACITOR, FIXED, CERAMIC: same as C21	913 3013 00
C24	CAPACITOR, FIXED, CERAMIC: same as C21	913 3013 00
C25	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C26	CAPACITOR, FIXED, MICA: 20 uuf, ±10%, 500 v dc	912 2766 00
C27	CAPACITOR, FIXED, CERAMIC: 4700 uuf, +100%, -20%, 500 v dc	913 3012 00
C28	CAPACITOR, VARIABLE, CERAMIC: 8 to 75 uuf, 350 v dc	917 1075 00
C29	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C30	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C31	CAPACITOR, FIXED, CERAMIC: same as C21	913 3013 00
C32	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C33	CAPACITOR, FIXED, CERAMIC: same as C21	913 3013 00
C34	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C35 thru C37	CAPACITOR, FIXED, CERAMIC: same as C2	913 3009 00
C38	CAPACITOR, FIXED, MICA: 100 uuf, ±10%; 500 v dc	912 0495 00
C39	CAPACITOR, FIXED, MICA: same as C1	912 0432 00
CR1	SEMICONDUCTOR DEVICE, DIODE: germanium; type 1N60	353 2010 00
CR2	SEMICONDUCTOR DEVICE, DIODE: germanium; type 1N67A	353 0147 00
CR3	SEMICONDUCTOR DEVICE, DIODE: same as CR2	353 0147 00
CR4	SEMICONDUCTOR DEVICE, DIODE: same as CR1	353 2010 00
CR5	SEMICONDUCTOR DEVICE, SET: 1 matched pair diode semiconductor device, type 1N67	353 0127 00
CR6	SEMICONDUCTOR DEVICE, SET: same as CR5	353 0127 00
CR7	SEMICONDUCTOR DEVICE, DIODE: same as CR2	353 0147 00
CR8	SEMICONDUCTOR DEVICE, DIODE: same as CR1	353 2010 00
E1	SHIELD, ELECTRON TUBE: for 9 pin noval, 0.950 in. od by 1-15/16 in. lg	141 0329 00
E2 thru E4	SHIELD, ELECTRON TUBE: same as E1	141 0329 00
L1	TRANSFORMER, AUTO: 4.0 mc, 1 winding, 0.7 to 1.1 uh inductance, 11 turns no. 32 AWG wire, 1 tap, tapped at 1-3/4 turns phenolic coil form	278 0291 00
L2	COIL, RADIO FREQUENCY: universal wound, 32 AWG formvar wire; 0.8 to 1.8 uh, 30 ma	240 0822 00
L3	COIL, RADIO FREQUENCY: same as L2	240 0822 00
L4	COIL, RADIO FREQUENCY: universal wound, 32 AWG formvar wire; 1.3 to 3.0 uh, 30 ma	240 0823 00
L5	COIL, RADIO FREQUENCY: single layer wound; magnet wire; 4.70 uh inductance	240 0160 00
L6	COIL, RADIO FREQUENCY: single layer wound; 15 uh, 0.60 ohms, 910 ma	240 0166 00
R1	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/4 w	745 0773 00
R2	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%, 1/4 w	745 0737 00
R3	RESISTOR, FIXED, COMPOSITION: 82,000 ohms, ±10%, 1/2 w	745 1433 00
R4	RESISTOR, FIXED, COMPOSITION: 2700 ohms, ±10%, 1/2 w	745 1370 00
R5	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, ±10%, 1/4 w	745 0797 00
R6	RESISTOR, FIXED, COMPOSITION: same as R2	745 0737 00
R7	RESISTOR, FIXED, COMPOSITION: same as R3	745 1433 00
R8	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±10%, 1/4 w	745 0785 00
R9	RESISTOR, FIXED, COMPOSITION: same as R2	745 0737 00
R10	RESISTOR, FIXED, COMPOSITION: same as R4	745 1370 00
R11	RESISTOR, FIXED, COMPOSITION: same as R3	745 1433 00
R12	RESISTOR, FIXED, COMPOSITION: same as R8	745 0785 00
R13	RESISTOR, FIXED, COMPOSITION: same as R4	745 1370 00
R14	RESISTOR, FIXED, COMPOSITION: 14,000 ohms, ±10%, 1/4 w	745 0791 00
R15	RESISTOR, FIXED, COMPOSITION: 39,000 ohms, ±10%, 2 w	745 5719 00
R16	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±10%, 1/4 w	745 0857 00
R17	RESISTOR, FIXED, COMPOSITION: 3,300 ohms, ±10%, 1/4 w	745 0767 00
R18	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 1 w	745 3429 00
R19	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1/4 w	745 0809 00
R20	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1 w	745 3422 00
R21	RESISTOR, FIXED, COMPOSITION: same as R2	745 0737 00
R22	RESISTOR, FIXED, COMPOSITION: 27,000 ohms, ±10%, 2 w	745 5712 00
R23	RESISTOR, FIXED, COMPOSITION: same as R19	745 0809 00
R24	RESISTOR, FIXED, COMPOSITION: same as R16	745 0857 00
R25	RESISTOR, VARIABLE: composition; 10,000 ohms, ±30%, 1/4 w (incl S1)	376 7627 00
R26	RESISTOR, FIXED, COMPOSITION: same as R1	745 0773 00
R27	RESISTOR, FIXED, COMPOSITION: 100,000 ohms, ±10%, 1/4 w	745 0821 00
R28	RESISTOR, FIXED, COMPOSITION: same as R16	745 0857 00
R29	RESISTOR, FIXED, COMPOSITION: same as R5	745 0797 00
R30	RESISTOR, FIXED, COMPOSITION: same as R17	745 0767 00
R31	RESISTOR, FIXED, COMPOSITION: 0.27 megohms, ±10%, 1/4 w	745 0836 00
R32	RESISTOR, VARIABLE: composition; 2,500 ohms, ±20%, 1/2 w	380 6286 00
R33	RESISTOR, FIXED, COMPOSITION: 2,200 ohms, ±10%, 1/4 w	745 0761 00
R34	RESISTOR, FIXED, COMPOSITION: same as R33	745 0761 00
R35	RESISTOR, FIXED, COMPOSITION: 1,000 ohms, ±10%, 1/4 w	745 0749 00
R36	RESISTOR, FIXED, COMPOSITION: 2,700 ohms, ±10%, 1/4 w	745 0764 00
R37	RESISTOR, FIXED, COMPOSITION: same as R2	745 0737 00
R38	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 1/2 w	745 1429 00
R39	RESISTOR, FIXED, COMPOSITION: 0.12 megohms, ±10%, 1/2 w	745 1440 00
R40	RESISTOR, FIXED, COMPOSITION: same as R19	745 0809 00
R41	RESISTOR, FIXED, COMPOSITION: same as R19	745 0809 00
R42	RESISTOR, FIXED, COMPOSITION: same as R38	745 1429 00
S1	SWITCH PUSH: spst, 3 amp at 125 v (incl R25)	376 7627 00
T1	TRANSFORMER, DISCRIMINATOR: 2.5 mc center frequency, shielded, 0.525 in. dia by 11/16 in. lg, ferrite core, 5 wire lead terminals	278 1710 00
T2	TRANSFORMER, RADIO FREQUENCY: 2 windings, ferrite case, ferrite coil form, turn ratio 1.1, 4 wire terminals	278 1711 00
V1	ELECTRON TUBE: triode-pentode; type 6U8A	255 0328 00
V2 thru V4	ELECTRON TUBE: same as V1	255 0328 00

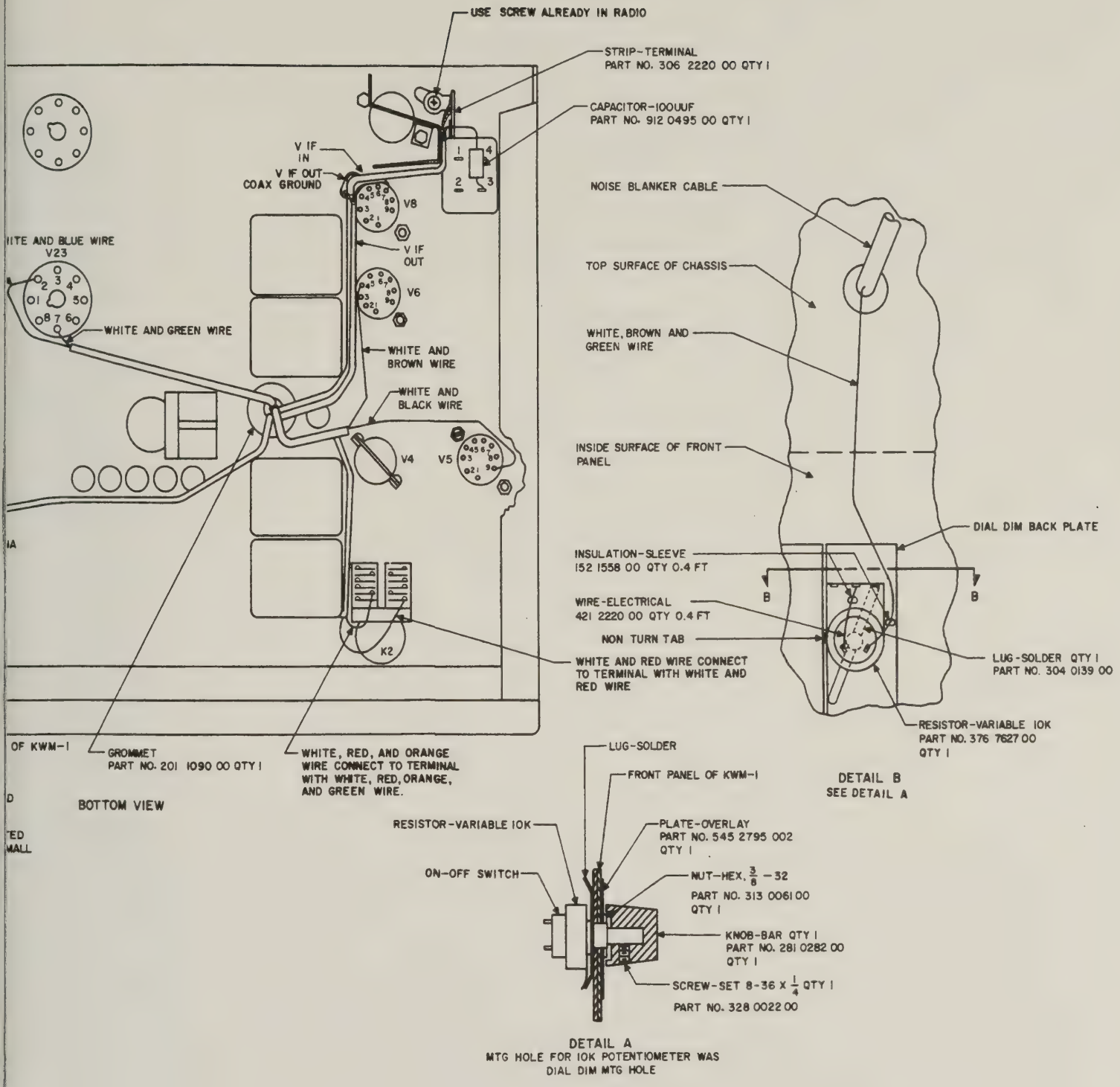

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Figure 6. 136B-1 Noise Blanker, Installation Diagram

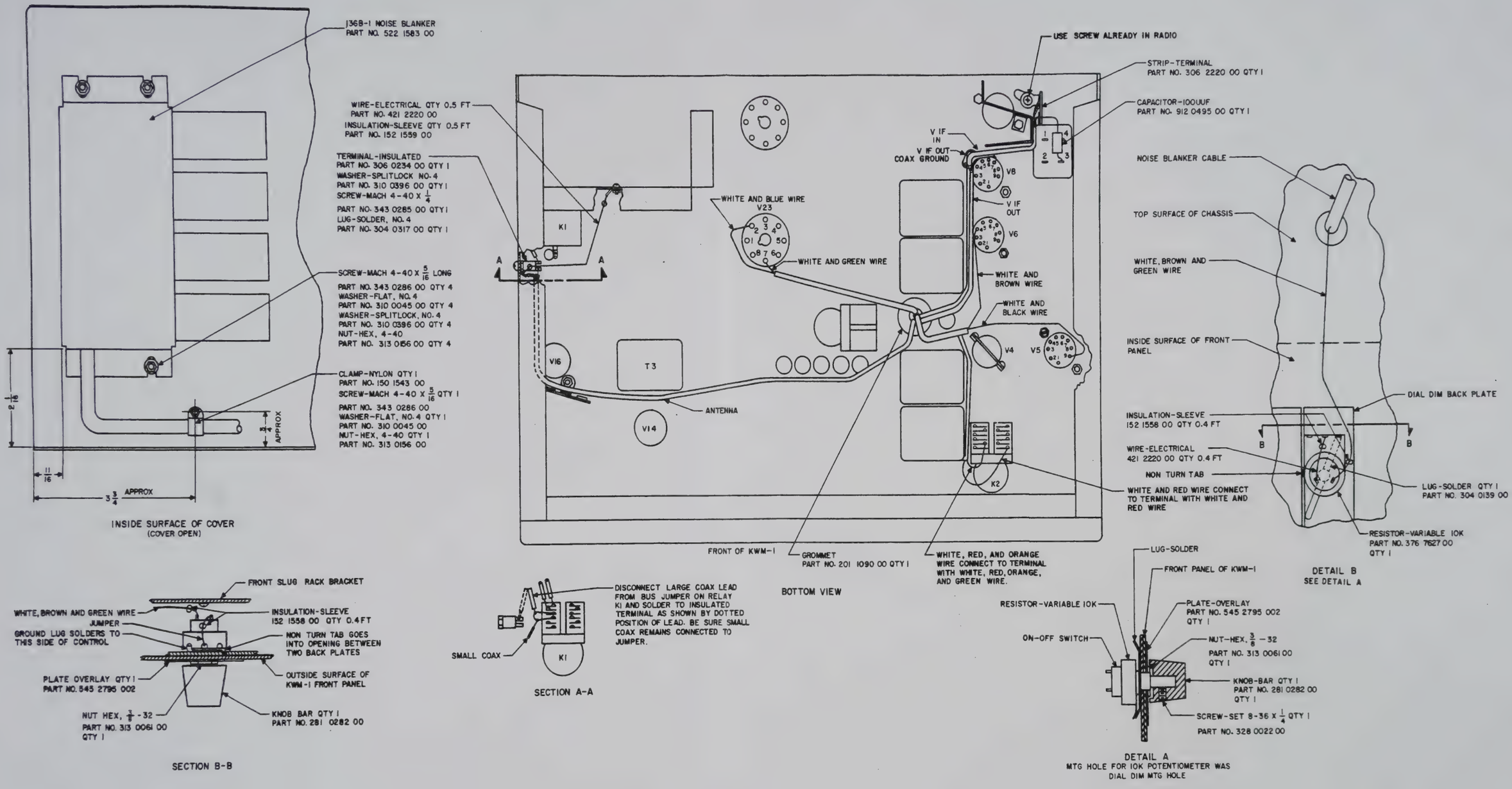

Figure 6. 136B-1 Noise Blanker, Installation Diagram

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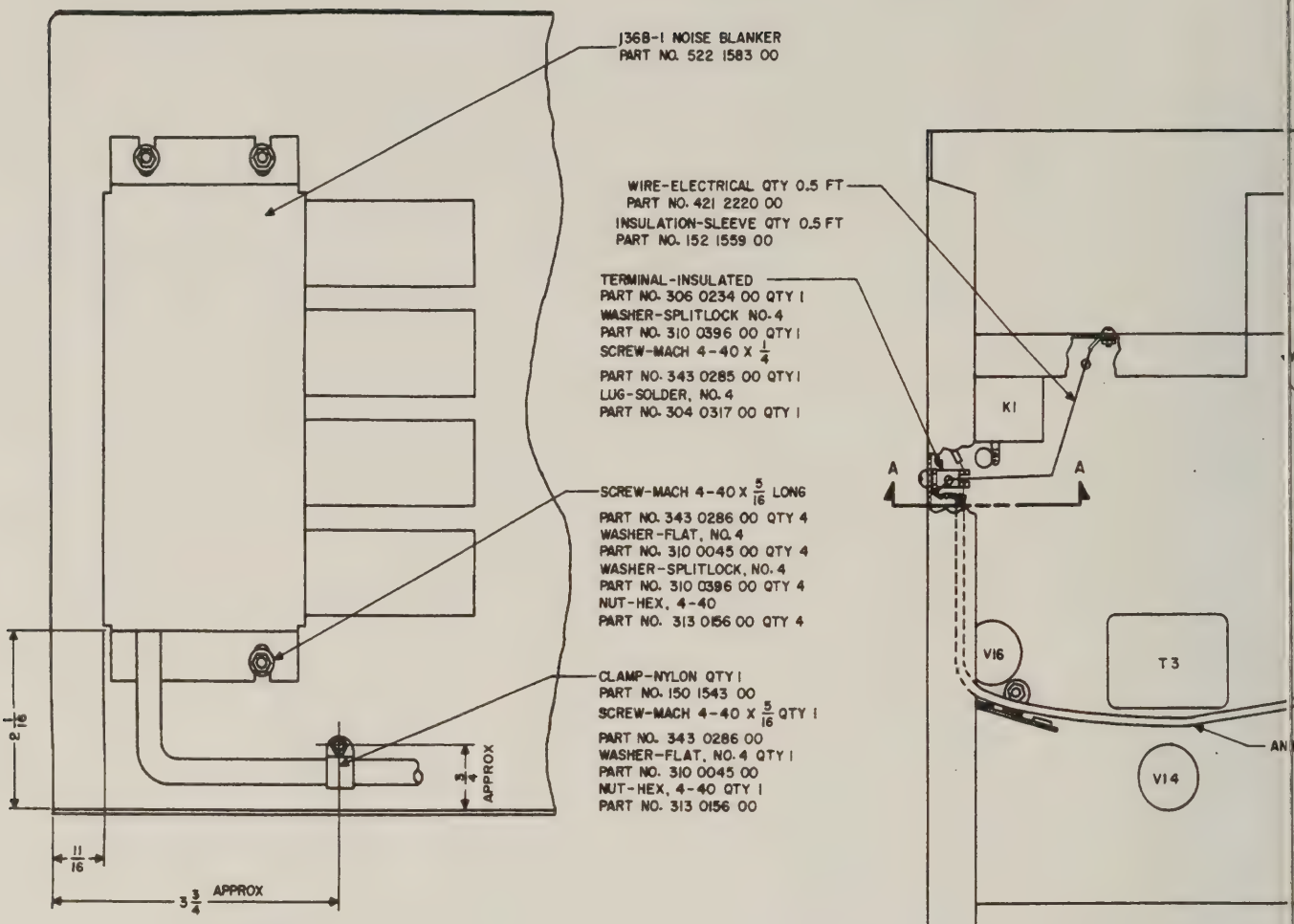
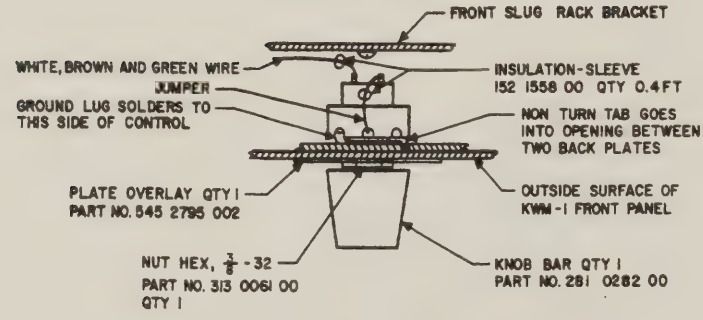
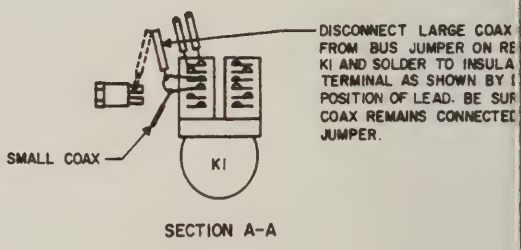


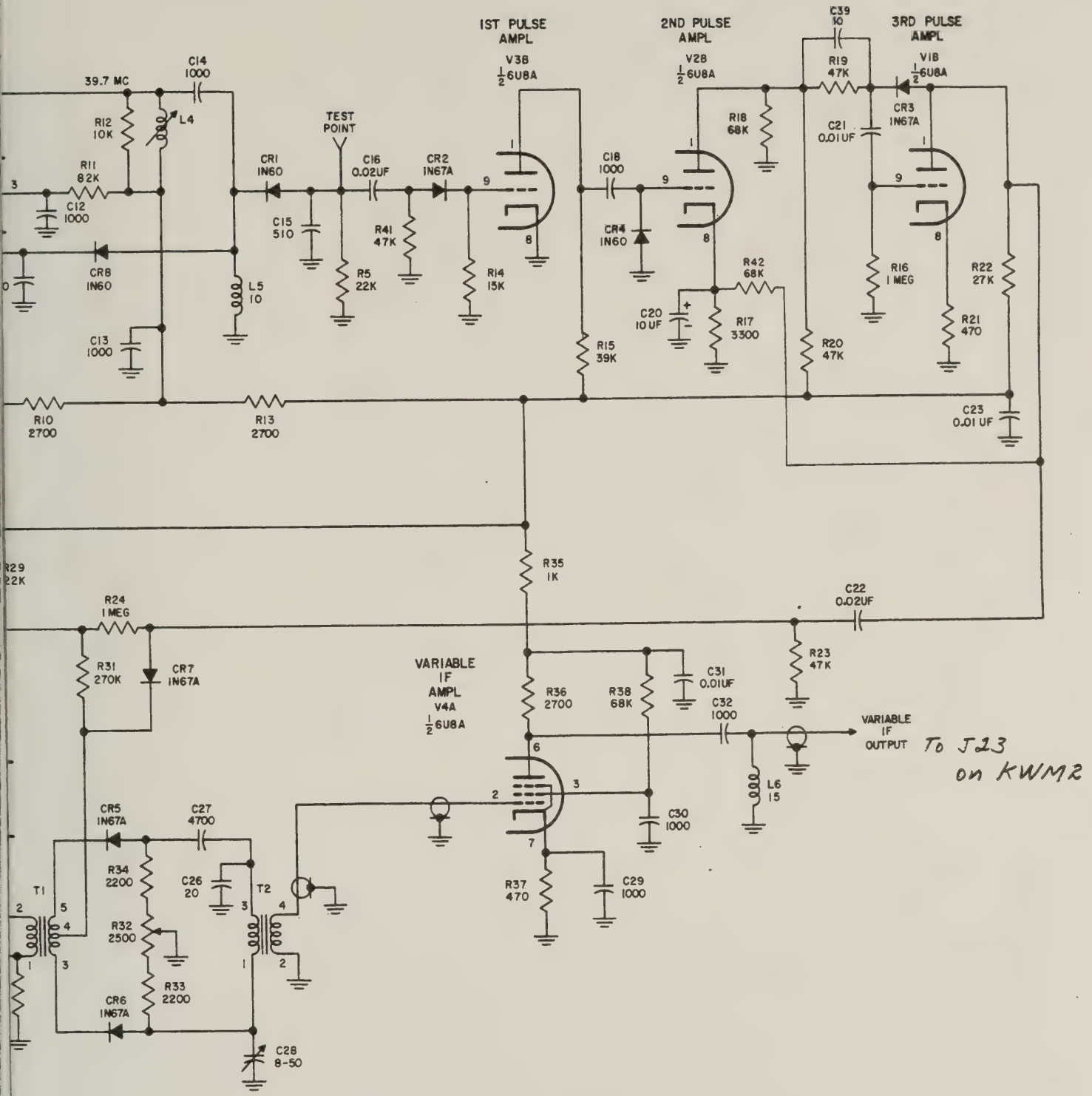
INSIDE SURFACE OF COVER
(COVER OPEN)



SECTION B-B

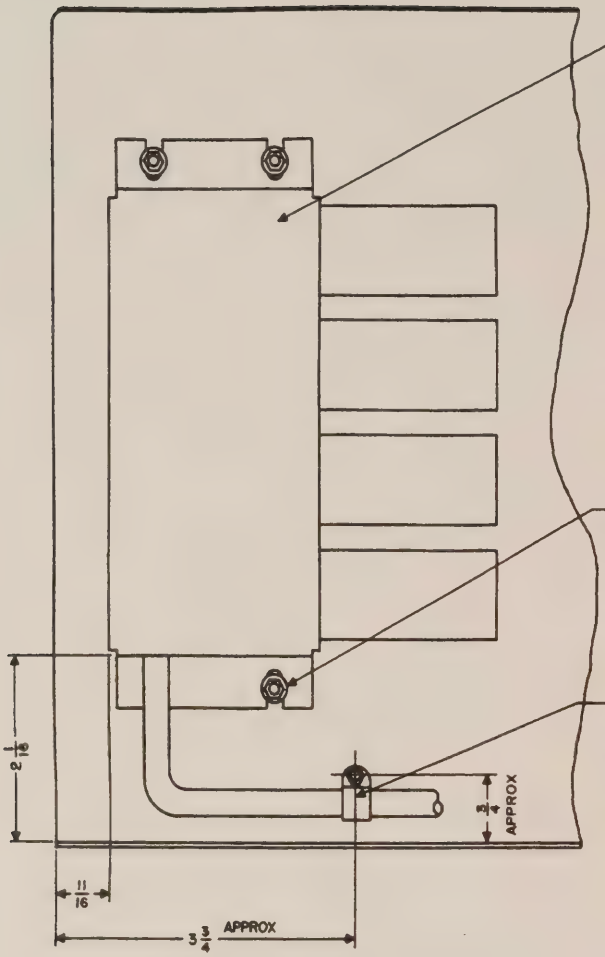


SECTION A-A

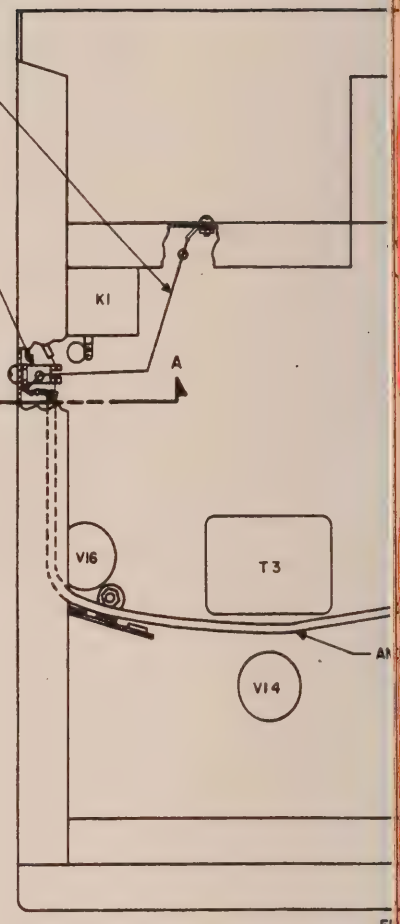


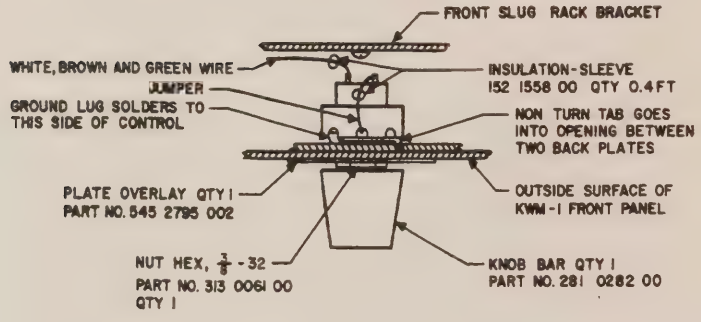
C459-01-5

Figure 7. 136B-1 Noise Blanker, Schematic Diagram

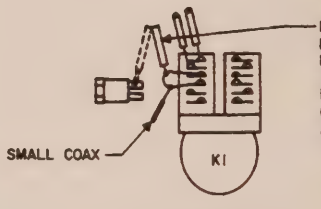


INSIDE SURFACE OF COVER
(COVER OPEN)

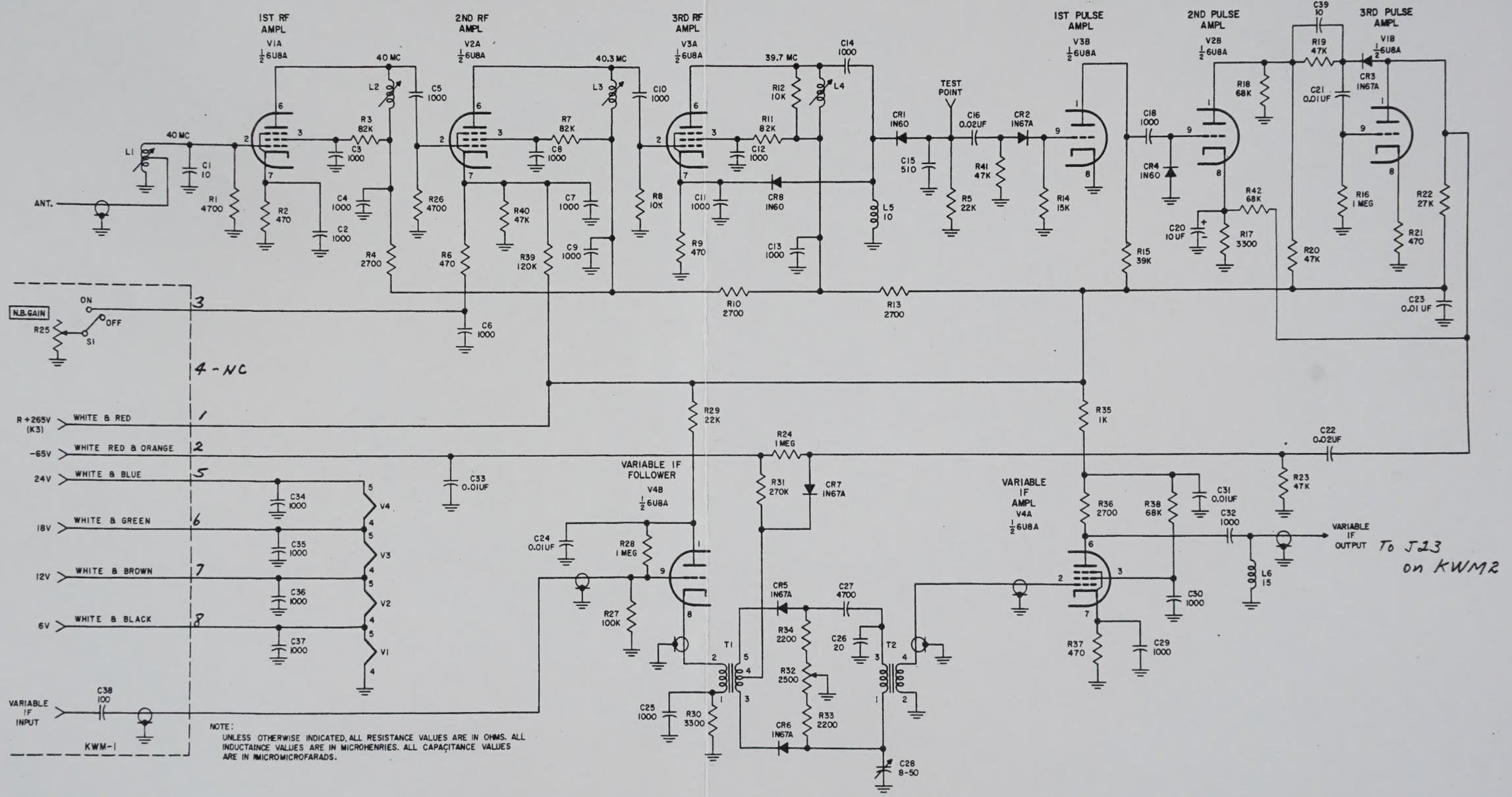




SECTION B-B



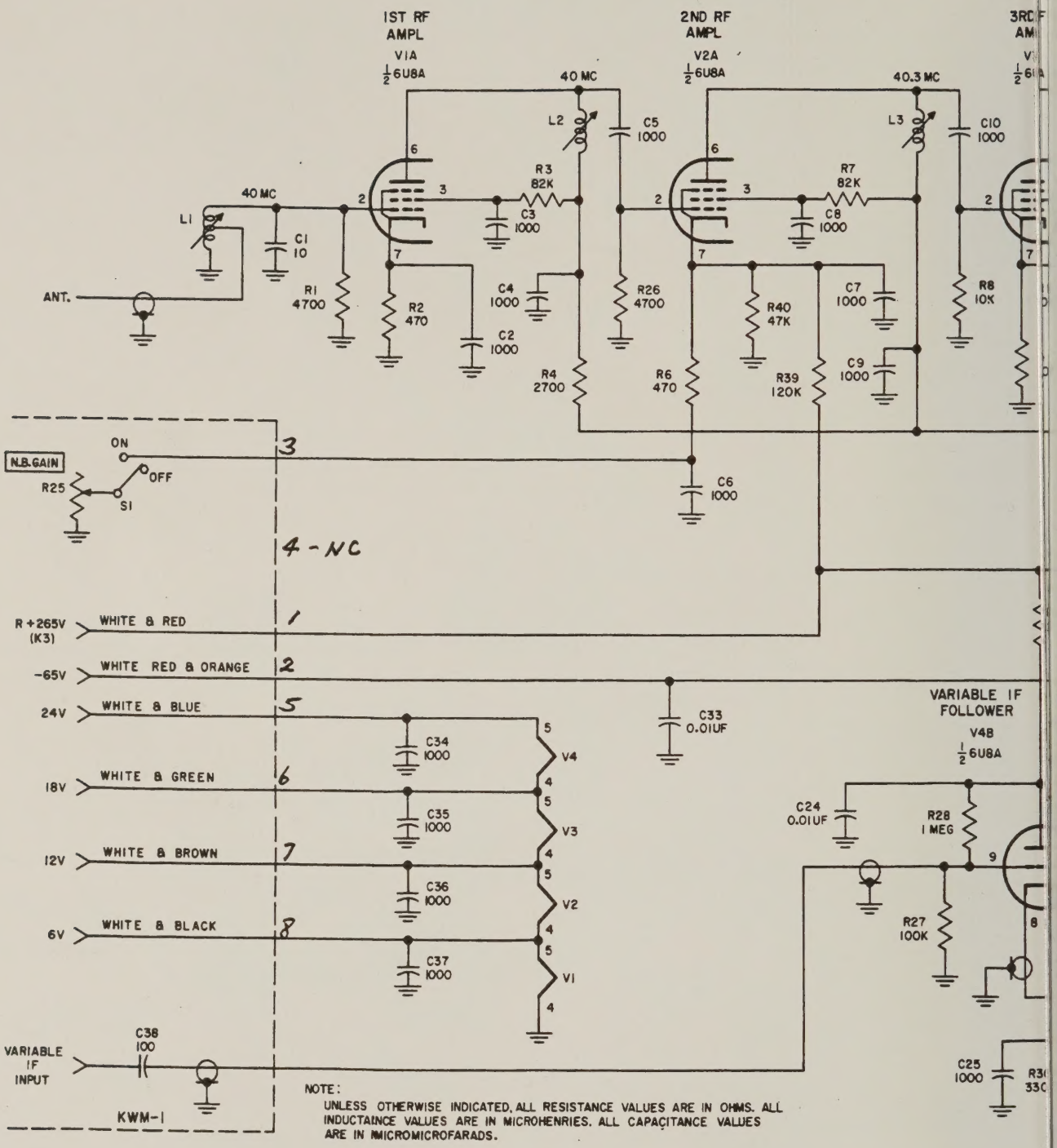
SECTION A-A



NOTE:
UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS. ALL INDUCTAINCE VALUES ARE IN MICROHENRIES. ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS.

C459-81-5

Figure 7. 136B-1 Noise Blanker, Schematic Diagram



NOTE:
UNLESS OTHERWISE INDICATED, ALL RESISTANCE VALUES ARE IN OHMS. ALL INDUCTAINCE VALUES ARE IN MICROHENRIES. ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS.

COLLINS RADIO COMPANY